Original Article

Obesity as a Risk Factor for Age-related Cataract in a Nigerian Population

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Abstract

Purpose: The purpose of the study was to investigate the relationship between obesity and age-related cataract in a Nigerian Population. **Materials and Methods:** Ninety adult patients aged between 45 and 65 years with age-related cataract were matched with ninety adult patients aged between 45and 65 years without cataract based on age and gender. Pretested interviewer-administered questionnaires were used to obtain information on demographics, educational levels, and occupation. Cataract was evaluated using a modified World Health Organization grading system. Body mass index (BMI) was categorized into four groups (underweight: BMI 15–19.9; normal weight: BMI 20–24.9; overweight: BMI 25–29.9; and obese: BMI >30). The association between degree and type of cataract and obesity was evaluated. Data was analyzed using IBM SPSS version 21. Confidence intervals of 95% and $P < 0.005$ were considered statistically significant. **Results:** Female participants had significantly higher mean BMI than males (27.56 ± 6.33 vs. 24.95 ± 4.35 $P = 0.002$). There was however no statistically significant difference noted in mean BMI based on the age groups or the levels of education**.** There was no statistically significant difference in BMI between participants with and without cataract (26.16 ± 5.87 vs. 27.56 ± 6.33, $P = 0.824$) regardless of the type and grade of cataract. **Conclusion:** The study showed a lack of association between obesity and cataract, further studies are required to explore causality.

Keywords: Age-related, body mass index, cataract, obesity

Introduction

The risk of developing cataract, which is defined as lens opacity, increases with age.[1] The World Health Organization (WHO) in 2019 reported that at least 65.2 million people have moderate-to-severe distance vision impairment or blindness due to cataract.[1] In Nigeria, cataract is the most common cause of severe visual impairment and blindness responsible for 45.3% and 43.0%, respectively, in those aged 40 years and above.[2] There are several risk factors for age-related cataract (ARC) including increased basal metabolic rate (body mass index [BMI]).[3-5] A meta-analysis that pooled relative risks and 95% confidence intervals (CIs) to determine this risk suggested that for every 1 kg/m^2 increase in BMI, there was a 2% increased risk of ARC (RR 1.02, 95% CI: 1.01–1.03).[6] The relationship between BMI and cataract is controversial across observational studies, with reports of positive linear relationship,[3-7] reduced risk in obese people,[8,9] and no significant relationship.[10,11]

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The aim of the study was to determine if any relationship exists in a Nigerian population.

Materials and Methods

This comparative cross-sectional study was carried out between January and April 2018. Ethical clearance was obtained from the Institutional Health Research Ethics Committee and the study adhered to the tenants of the Helsinki Declaration. Data was extracted from questionnaires passed out for a larger study among patients attending the eye clinic.

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Adult patients aged between 45 and 65 years with ARC who visited the outpatient eye clinic within the study period and gave written informed consent were matched with adult patients between 45 and 65 years without cataract based on age and gender. Patients with any corneal lesions or opacification that would disallow proper lens assessment, patients with acute or chronic ocular inflammations, diabetic patients whose cataract could be a complication of the disease, patients with an acute illness requiring medications in the last two weeks, and patients with the shallow anterior chamber on anterior segment examination that would have increased the risk of angle-closure when dilated were all excluded from the study.

A sample size of 180 consenting participants who met the inclusion criteria with 90 in the cataract group and 90 in the no cataract group was estimated. The structured pretested questionnaire administered to the participants covered their demographics, educational levels, occupation, and BMI.

Levels of education were classified as primary (1°) level of education: participants who have attended only primary school, whether completed or not; secondary (2°) level of education: Participants who have completed primary and attended secondary schools, whether completed or not; tertiary (3°) level of education: participants who have finished secondary school and attended colleges of education or technology or university; and others: Participants who have undergone any form of informal education, for example, Islamic schools only, with no formal system.

BMI was classified as weight (kg)/height (m^2); underweight: BMI 15–19.9; normal weight: BMI 20–24.9; overweight: BMI 25–29.9; and obese: BMI >30.[12] All participants had ocular examinations done, and after dilatation, those with cataract had their lens opacities assessed for type and grade of cataract by a single ophthalmologist using the modified WHO grading system.

Data was analyzed using SPSS 21 software (IBM Corporation, New York, NY, USA) and findings were expressed as means ± standard deviations. Bivariate correlations were performed by Spearman rank correlation coefficient. Statistical significance was set at $P < 0.05$.

Results

A total of 180 participants between the ages of 45 and 65 years participated in the study. Ninety persons were in the cataract (ARC) group, while 90 persons were in the no cataract group matched for age and gender. Age-frequency matching was carried out in five-year age groups' intervals.

The sociodemographic characteristics of the cataract and no cataract group revealed that the two groups were comparable on the two matching variables with similar gender proportions as 43 (47.8%) were male in the cataract group and 47 (52.2%) in the no cataract group. This observed difference was not statistically significant ($\chi^2 = -0.356$, $P = 0.551$). They also had a similar age distribution with the mean age being 57.08 ± 5.80 years for the cataract group and 55.82 ± 6.07 years for the no cataract group ($P = 0.158$) [Table 1].

Female participants had significantly higher mean BMI than the male participants (27.56 ± 6.33 vs. 24.95 ± 4.35 $P = 0.002$). There was however no statistically significant difference noted in mean BMI based on the age groups or the levels of education, as shown in Table 2.

There was no statistically significant difference in the mean BMI between participants with and without cataract (26.16 ± 5.87 vs. 27.56 ± 6.33, $P = 0.824$) regardless of the type and grade of cataract [Table 3].

The BMI scatter plot showed a steady decline as the grade of the cataract increases, this was however not statistically significant (correlation coefficient = −0.158, $P = 0.136$) [Figure 1].

Discussion

Obesity is said to be a risk factor for ARC.[7] It is generally believed to accelerate ARC; several prospective observational studies have confirmed a positive longitudinal association between obesity and different types of cataract.[13] This study found more overweight and obese participants to be female and those with tertiary levels of education. In Nigeria, being overweight and obese is considered a sign of good living by many, the diet is also mainly carbohydrate-based, and among the poor, quality is most often forfeited in preference to quantity which could explain the mean values of BMI being on the high side across educational levels that correspond to socioeconomic levels.

Our study showed that there was no statistically significant difference in BMI among participants with cataract and those with no cataract, regardless of the grade of cataract or the type of cataract. It also showed that although there was a linear regression, with BMI decreasing as the grade of cataract increased, this was not statistically significant. The findings of this study are in keeping with those obtained from a similar hospital-based cross-sectional study carried out in Tehran that aimed to revisit the growing dilemma of the relationship between

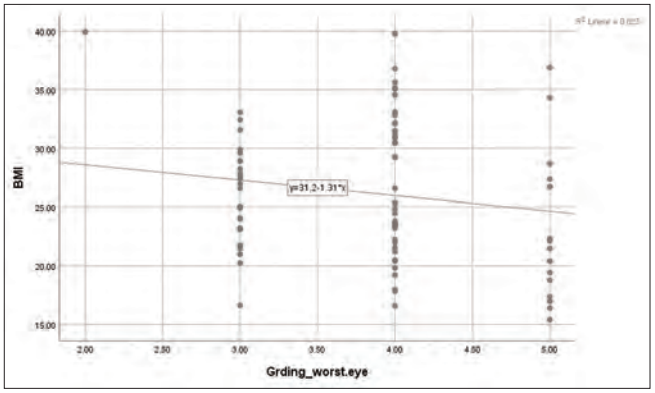

Figure 1: Scatter plot of body mass index versus cataract grading. Correlation coeffecient = −0.158, $P = 0.136$

Table 1: Sociodemographic characteristics of participants among the cataract and no cataract groups

Variables	Cataract ($n=90$), *n* (%)	No cataract ($n=90$), *n* (%)	χ^2	*P*
Gender				
Male	43 (47.8)	47 (52.2)	0.356	0.551
Female	47 (52.2)	43 (47.8)		
Total	90 (100)	90 (100)		
Occupation				
Skilled	21 (23.3)	45 (50)	16.781	0.001*
Semiskilled	33 (36.7)	14 (15.6)		
Unskilled	36 (40.0)	31 (34.4)		
Total	90 (100)	90 (100)		
Level of education				
Primary	18 (20)	11 (12.2)	10.018	0.018*
Secondary	11 (12.2)	16 (17.7)		
Tertiary	45 (50)	58 (64.4)		
Others	16 (17.8)	5 (5.6)		
Total	90 (100)	90 (100)		
Age				
45-49	8 (8.9)	25 (27.8)	32.098	0.16
50-54	25 (27.8)	8 (8.9)		
55-59	19 (21.8)	37 (41.1)		
60-64	25 (27.8)	8 (8.9)		
65-69	13 (14.4)	12 (13.3)		
Total	90 (100)	90 (100)		
Mean±SD	57.08±5.80	55.82±6.07		0.158

*P Significant at < 0.05, SD: Standard deviation

Table 2: Comparison of body mass index across sociodemographic variables

Variables	BMI (kg/m^2), mean±SD	*F*	*P*
Gender			
Male (*n*=90)	24.95±4.35	−3.223**	0.002*
Female (*n*=90)	27.56±6.33		
Age grouping			
45-49 (*n*=33)	24.80±4.92	2.178	0.073
50-54 (*n*=33)	27.26±6.56		
55-59 (*n*=56)	27.40±4.92		
60-64 (*n*=33)	26.16±6.29		
65-69 (*n*=25)	24.39±4.74		
Level of education			
Primary (*n*=29)	25.87±4.64	1.635	0.183
Secondary (*n*=27)	26.43±5.75		
Tertiary (*n*=103)	26.79±5.72		
Others (*n*=21)	23.91±5.42		

**P* significant at<0.05, ***t*-test value. *F*=ANOVA test value. SD: Standard deviation, BMI: Body mass index

obesity and cataract.[14] Our study differed from findings from other studies that showed an increased risk associated with ARC.[3-6,15] A Korean population-based study found that the overweight group had a significantly lower risk of developing ARC, compared to the normal-weight group.[16] They could not find any unusual lifestyles or metabolic risks for explaining this low cataract prevalence in the overweight groups. However, nutrient intakes (e.g., Vitamin B2, niacin, Vitamin C, and Vitamin A) were highest in the overweight group.[16] A South African study found a lower prevalence of self-reported cataract among obese (4.2%) compared to nonobese (4.5%) individuals, while obese individuals were 13%–26% less likely to have cataract than nonobese ones in multivariate analysis.[17] They entertained the possibility of reverse causality and postulated that individuals in this study may have developed cataract before they became obese. The strength of this study includes the careful screening of the patients to exclude comorbidity and other possible risk factors for cataract, the diagnosis of cataract was clinical and not self reported, and standardized measures of weight and height were taken to calculate the BMI. Limitations of the study includes the small sample size and the fact that the study was a hospital-based study. The findings cannot thus be generalized to the whole population.

Conclusion

This study showed that no relationship exists between ARC and obesity. A prospective population-based study would be a good next step in assessing the effect of BMI on ARC.

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Table 3: Comparison of body mass index between cataract and no cataract group and across type and grade of cataract

Variables	BMI (kg/m²), mean±SD	*F*	*P*
Groups			
Cataract (*n*=90)	26.16±5.87	−0.223**	0.824
No cataract (*n*=90)	27.56±6.33		
Total (*n*=180)			
Cataract grading			
Grade 1 (*n*=1)	39.92	3.008	0.055
Grade 2 (*n*=27)	25.58±6.08		
Grade 3 and 9 (*n*=62)	26.19±6.36		
Total (*n*=90)			
Type of cataract			
Nuclear (*n*=15)	24.54±5.50	2.053	0.068
Cortical (*n*=27)	28.15±4.90		
PSC (*n*=13)	27.08±6.79		
Nuclear, cortical (*n*=2)	32.22±3.30		
Nuclear, PSC (*n*=5)	24.43±4.58		
Cortical, PSC (*n*=13)	26.35±5.93		
Full cataract (*n*=15)	23.00±6.29		
Total (*n*=90)			

**P* significant at<0.05, ***t*-test value. *F*=ANOVA test value. SD: Standard deviation, BMI: Body mass index, PSC: Posterior subcapsular cataract

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Conflicts of interest

There are no conflicts of interest.

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